

Ozone Data Quality from the SAGE-2/3, HALOE and Aura-MLS

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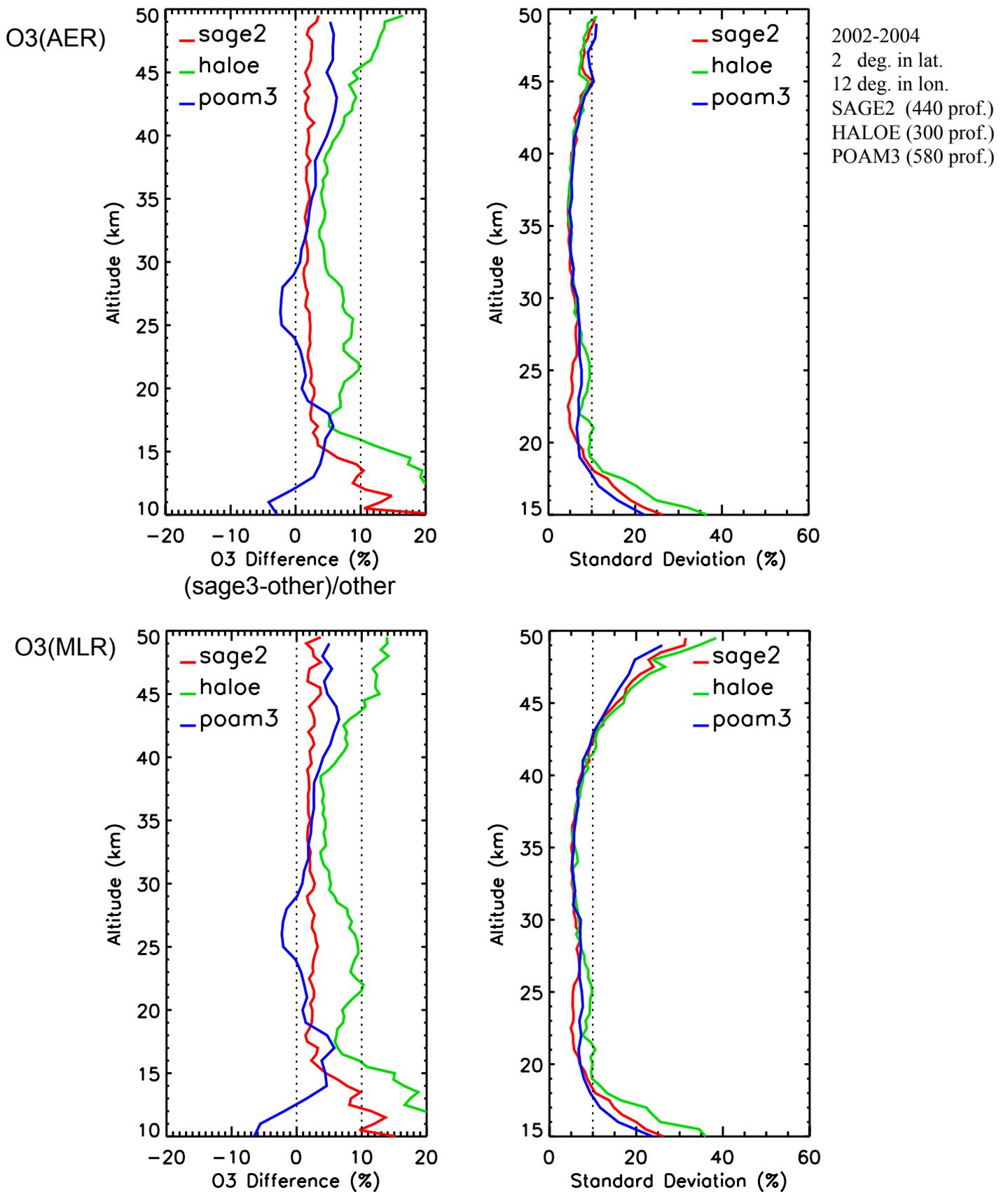
NASA Langley Research Center, Hampton, VA

Lucien Froidevaux

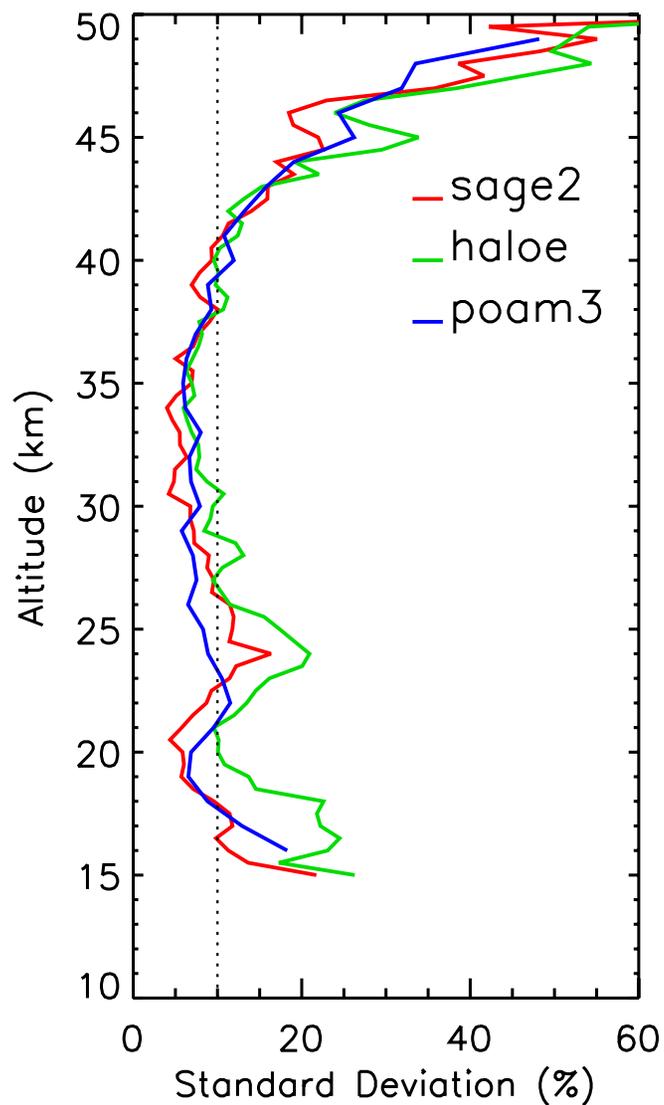
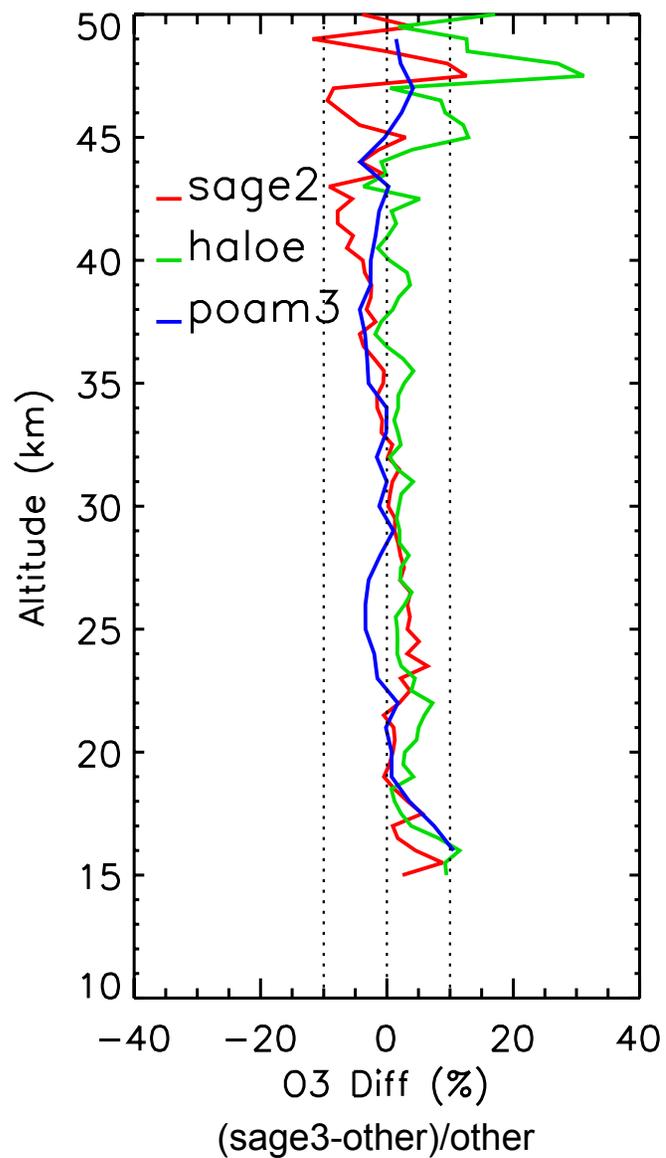
Jet Propulsion Laboratory, California Institute of Technology, USA

Aura Science Team Meeting, Pasadena, CA, March 1-3, 2005

Comparisons between SAGE-3 and correlative measurements

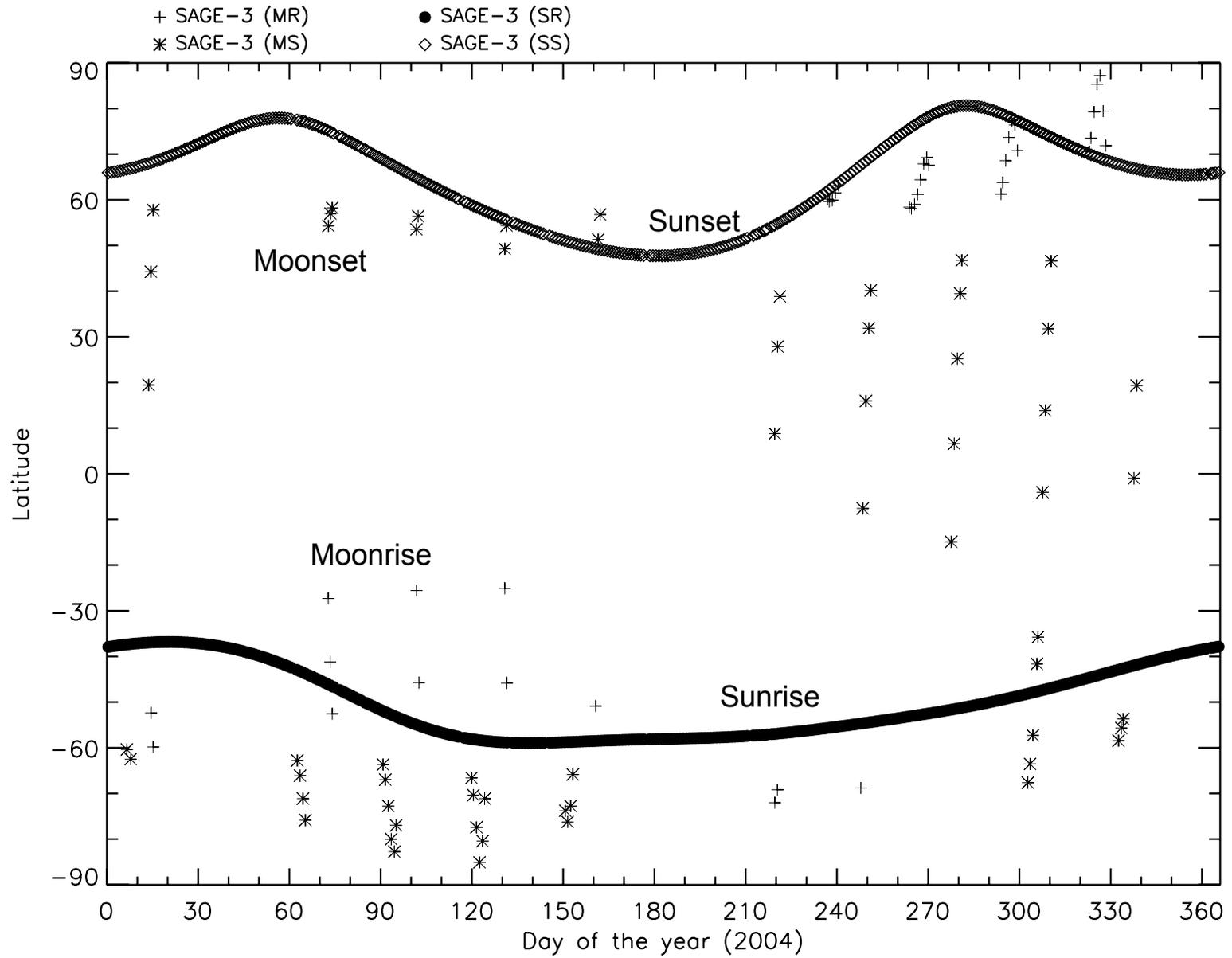


Mean differences and standard deviations between SAGE-3 (lunar) and correlative measurements

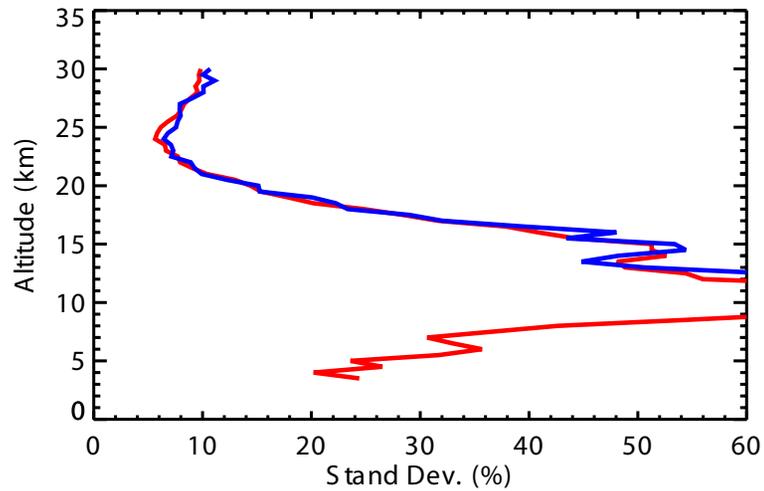
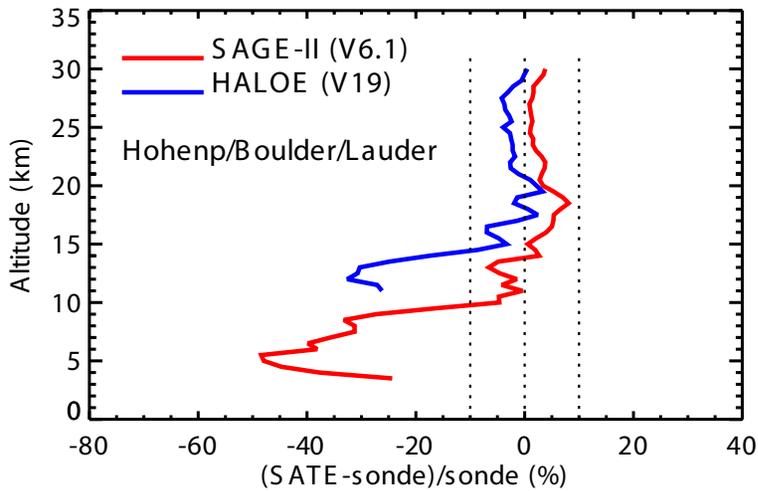


2002-2004
2 deg. in lat.
12 deg. in lon.
SAGE2 (36 profiles)
HALOE (38 profiles)
POAM3 (73 profiles)

Latitudinal coverages from the SAGE-3 measurements

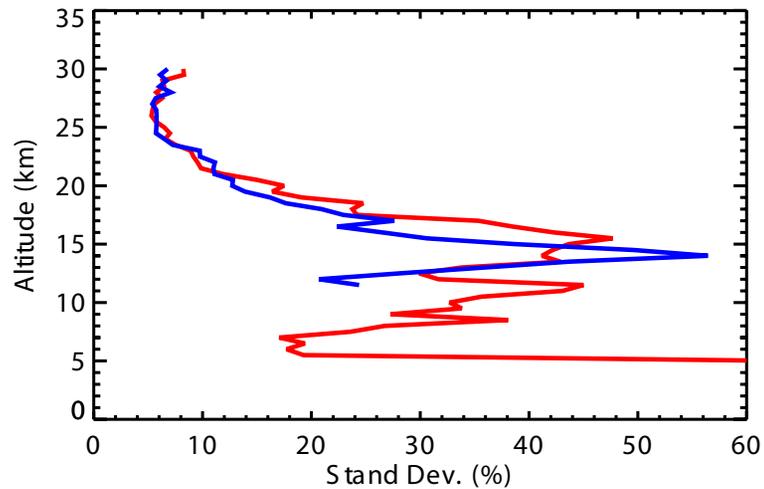
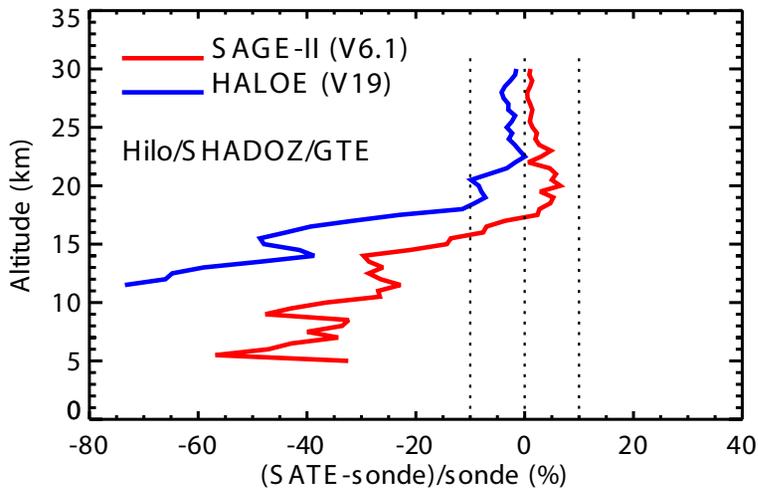


Comparisons between SAGE/HALOE O3 and ozonesondes



SAGE-2/sonde
(1985-2000)
~600 profiles

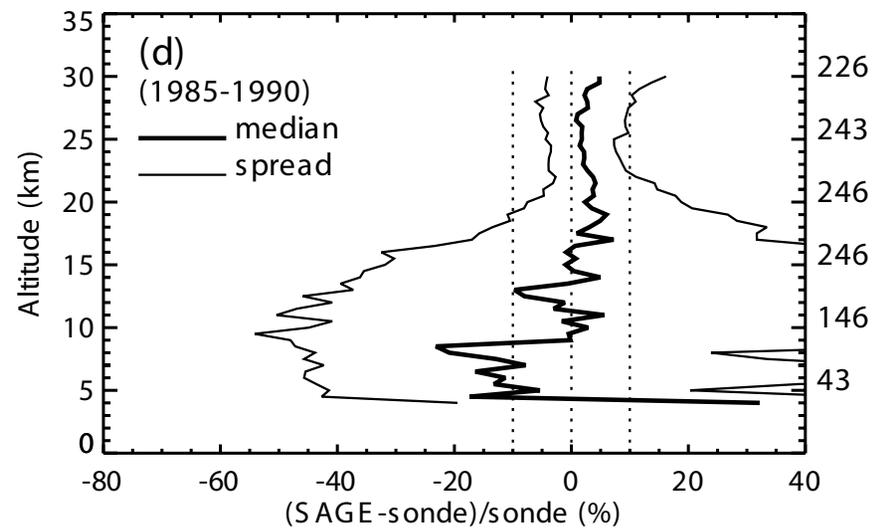
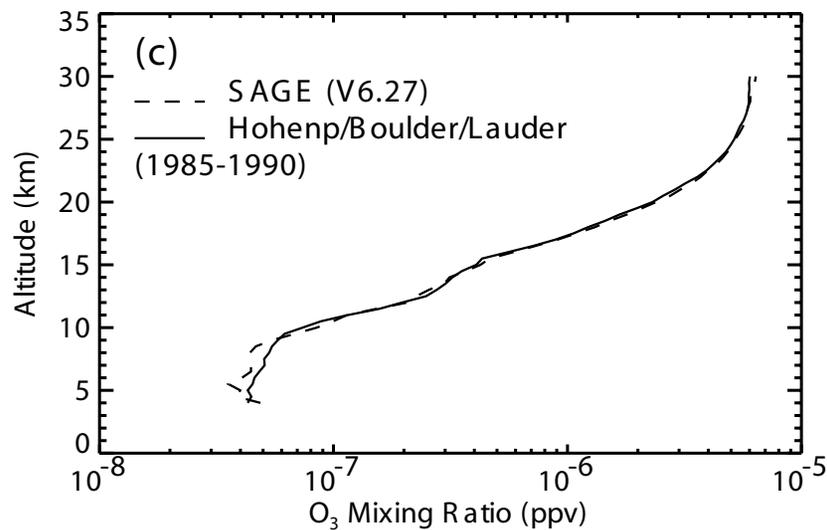
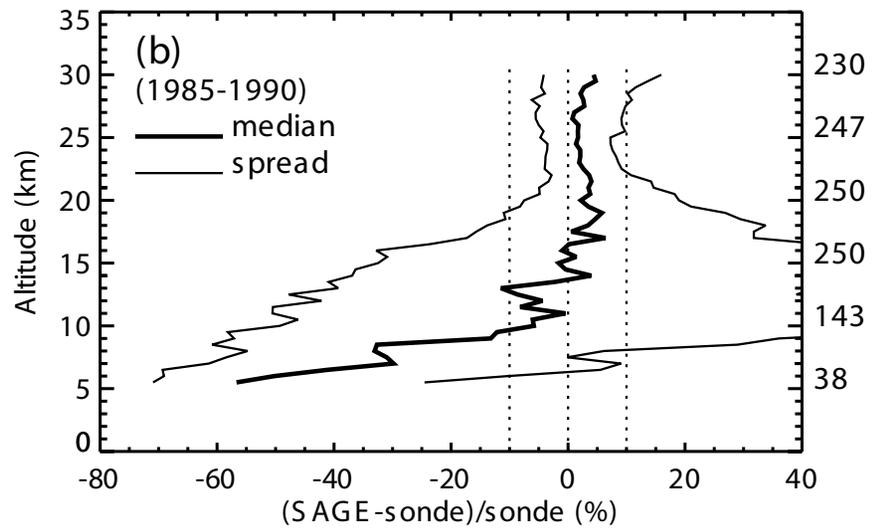
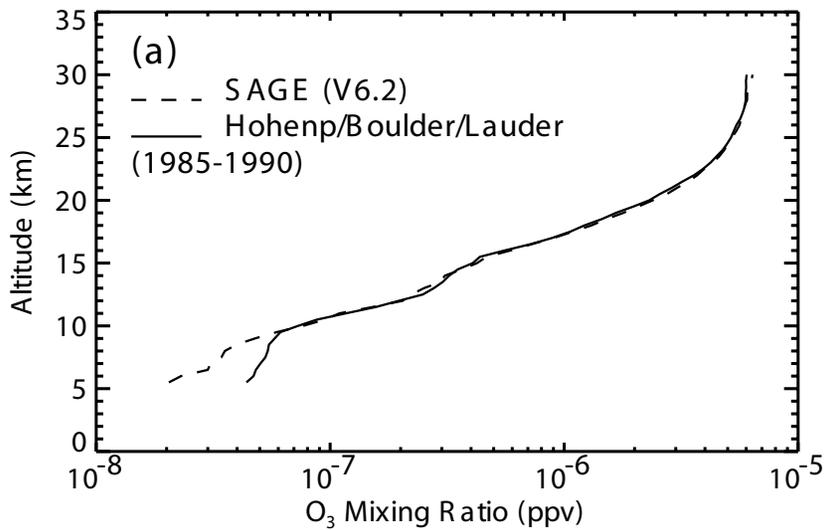
HALOE/sonde
(1992-2000)
~300 profiles



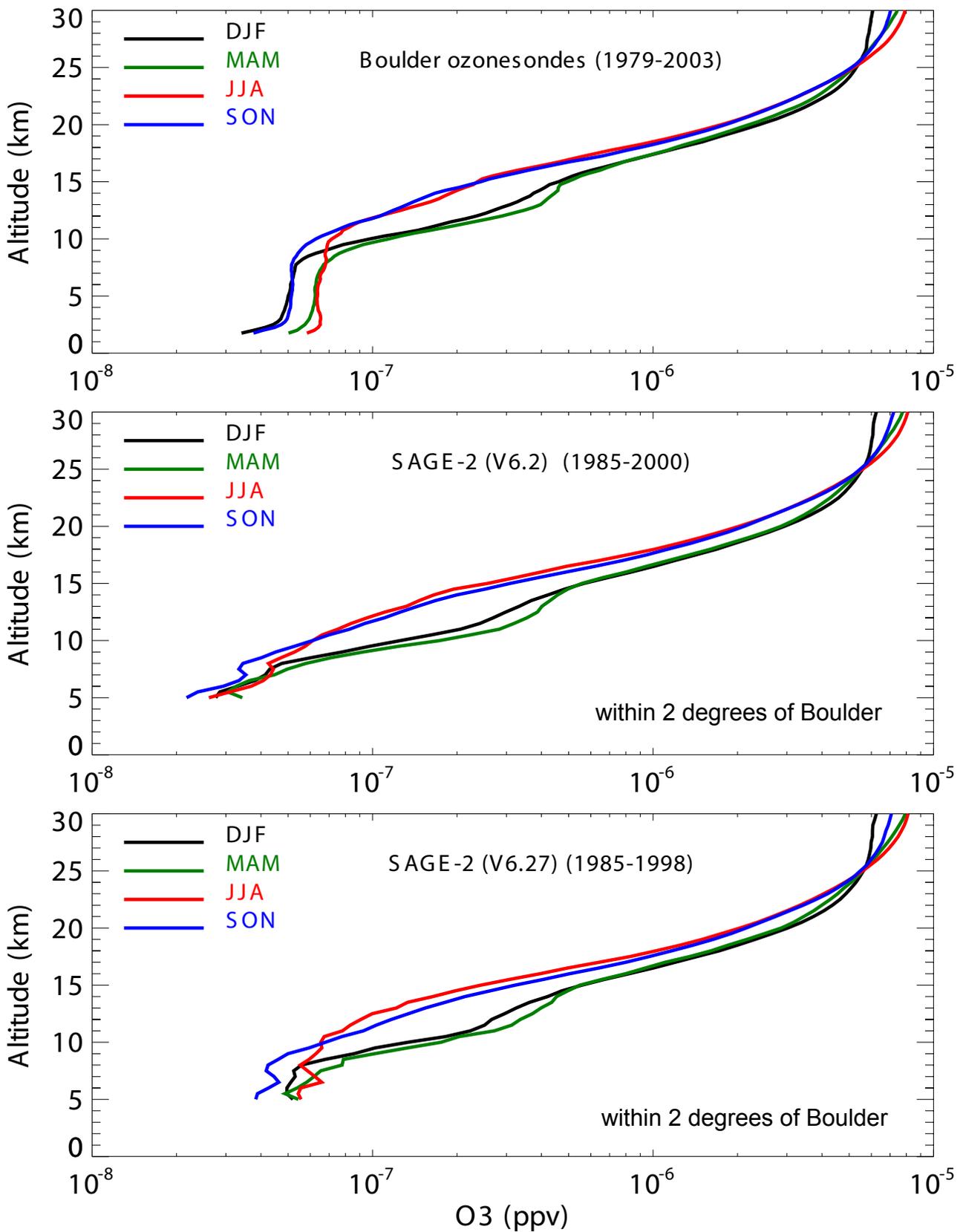
SAGE-2/sonde
(1985-2000)
~115 profiles

HALOE/sonde
(1992-2000)
~85 profiles

Comparisons between SAGE (V6.2) O₃ and ozonesondes

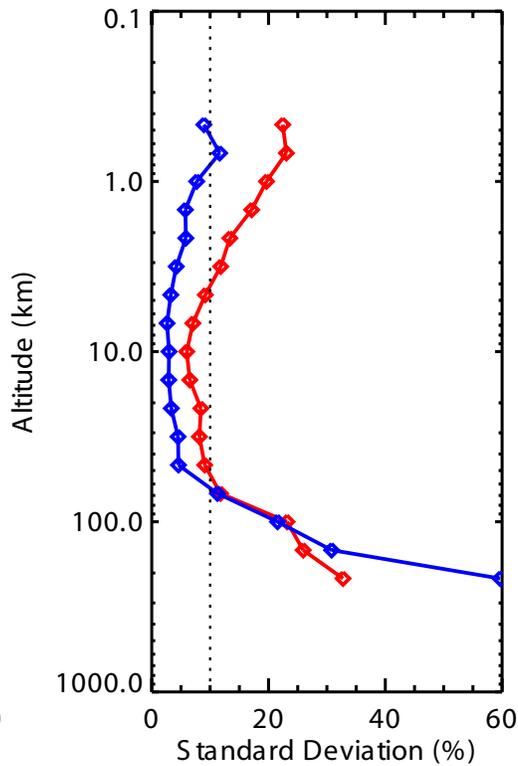
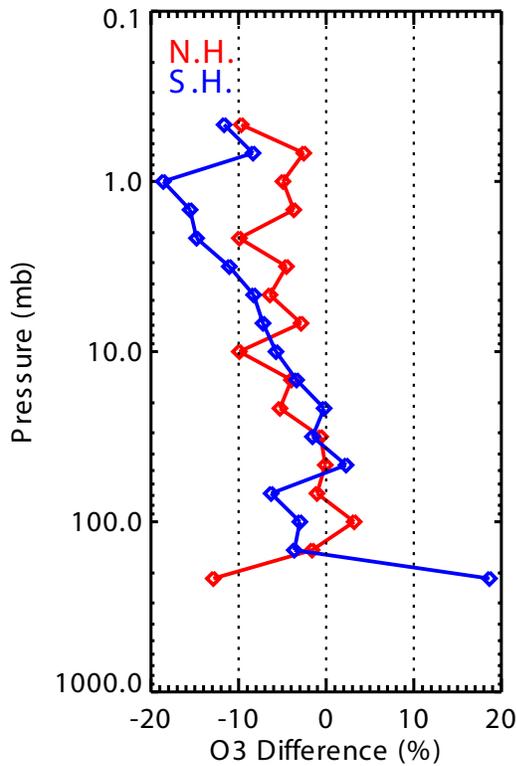


Ozone climatology from SAGE-2 and Boulder ozonesondes



Comparisons between Aura-MLS and SAGE-3/HALOE

(MLS-SAGE3)/SAGE3



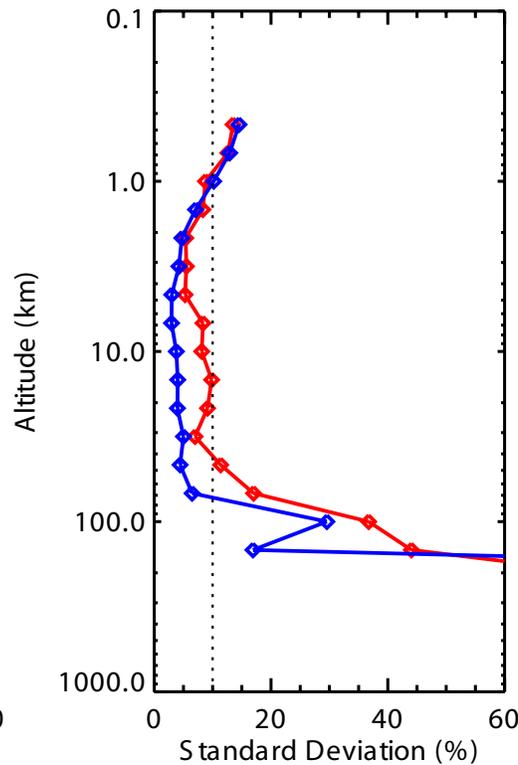
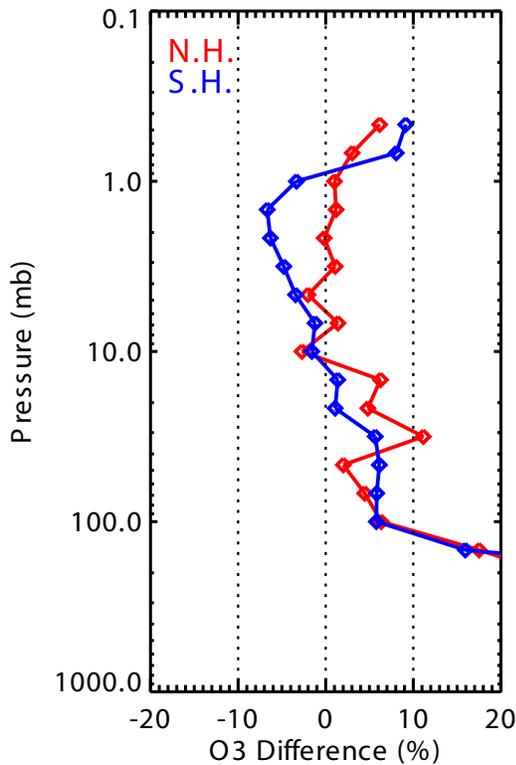
MLS (V1.50)
SAGE3 (V3.0)
HALOE (V19)

Jan. 2005
1 deg. in latitude
8 deg. in longitude

MLS/SAGE-3
coincident profiles
N.H.: 134
S.H.: 92

MLS/HALOE
coincident profiles
N.H.: 59
S.H.: 82

(MLS-HALOE)/HALOE



Relative ozone biases between HALOE and other satellites

Satellites	HALOE	UARS-MLS	SAGE-2	SAGE-3 (solar)	Aura-MLS	
Time periods	1991 - 1999			2002-2004	January 2005	
	mid-latitudes	mid-latitudes	mid-latitudes	mid-latitudes	N.H.	S.H.
1.0 mb (48km)	0	4 %	5 %	10 %	1 %	-6 %
2.1 mb (43 km)	0	2 %	-1 %	6 %	1 %	-5 %
4.6 mb (38km)	0	1 %	-1 %	5 %	0 %	-2 %
10 mb (32 km)	0	1 %	1%	4 %	1 %	-1 %
21 mb (27 km)	0	3 %	3 %	5 %	5 %	4 %
46 mb (22 km)	0	6 %	4 %	10 %	5 %	6 %
100 mb (16 km)	0	20 %	3 %	10 %	6 %	6 %
146 mb (13.5 km)	0 -15% ⁽¹⁾		18% 3 %	20% 5 %	17% 2 %	16% 1 %

(1) Based on HALOE/ozonesondes comparisons, HALOE ozone values have low bias of ~15%.

Summary

- The SAGE-3 solar ozone show good agreements (within 10%) with correlative measurements between 12 and 45 km.
- The SAGE-3 lunar ozone have similar accuracy (~10% or better) between 15 and 45 km altitudes.
- Between tropopause and 5 km above tropopause, the SAGE-2 ozone have better agreement (~10%) with sonde than HALOE.
- Preliminary results show Aura-MLS (V1.50) ozone agree with SAGE-3 and HALOE within 10% between 0.4 and 146 mb, except for measurements in the S.H. high altitudes (above 3mb) where measurements have low bias of ~10%.

Next 6 months plan

- Further evaluate the SAGE-3 ozone in the lower stratosphere by comparing with ozonesondes.
 - Use PV mapping technique in the lower stratosphere to correct/minimize the non-coincidence of various instruments.
- Investigate what causes the larger differences (~10%) between SAGE-3 and HALOE/MLS ozone in the upper stratosphere.
 - Some differences may relate to temperature/geopotential height uncertainty which affects the conversion from altitudes to pressures
- Collaborating with other Aura team members regarding to validation of O₃ and NO₂ from Aura instruments.